

**THAT WHICH IS CLAIMED IS:**

1. An isolated nucleic acid selected from the group consisting of:

5 (a) isolated nucleic acids consisting essentially of a sequence according to **SEQ ID NO: 1** or a fragment thereof, wherein said fragment is between about 20-455 consecutive nucleotides; and

(b) isolated nucleic acids that hybridize to the complement of **SEQ ID NO:1** and are responsive to a *Nic* gene product.

10 2. The isolated nucleic acid according to claim 1 consisting essentially of the sequence given herein as **SEQ ID NO:1** or a fragment thereof, wherein said fragment is between about 20-455 consecutive nucleotides.

15 3. The isolated nucleic acid according to claim 1 consisting essentially of the sequence given herein as **SEQ ID NO:1**.

4. The isolated nucleic acid according to claim 1, wherein said nucleic acid is a DNA.

20 5. The isolated nucleic acid according to claim 1, further comprising a recombinant nucleic acid construct, wherein said isolated nucleic acid is joined to said recombinant nucleic acid construct and said recombinant nucleic acid construct does not contain *NtOPT1* coding sequence.

25 6. The isolated nucleic acid according to claim 5, wherein said recombinant nucleic acid construct is linear.

7. The isolated nucleic acid according to claim 5, wherein said recombinant nucleic acid construct is circular.

30

- 35 -

8. The isolated nucleic acid according to claim 1, further comprising a microparticle, wherein said isolated nucleic acid is joined to said microparticle. .

9. The isolated nucleic acid according to claim 5, wherein said recombinant  
5 nucleic acid construct is an *Agrobacterium* vector.

10. A plant cell comprising the isolated nucleic acid according to claim 1.

11. A method of making a transgenic tobacco plant having a reduced amount  
10 of nicotine, comprising:

introducing a nucleic acid consisting essentially of a *Nic* gene product responsive element into at least one tobacco plant cell so as to produce at least one transformed tobacco plant cell,

said at least one transformed tobacco plant cell containing said nucleic acid in  
15 a copy number sufficient to reduce the amount of nicotine in a tobacco plant regenerated from said cell as compared to the amount of nicotine that would be present in the absence of said nucleic acid; and

regenerating said at least one transformed tobacco plant cell so as to obtain said tobacco plant.

20

12. The method of claim 11, further comprising:

collecting leaves from said tobacco plant, said tobacco leaves containing a reduced amount of nicotine as compared to the amount of nicotine that would be present in said tobacco plant in the absence of said nucleic acid.

25

13. The method according to claim 11, further comprising:

collecting tobacco seed from said tobacco plant, said tobacco seed containing said nucleic acid in a copy number sufficient to reduce the amount of nicotine of a tobacco plant regenerated from said seed as compared to the amount of nicotine that  
30 would be present in the absence of said nucleic acid.

- 36 -

14. The method according to claim 11, wherein said *Nic* gene product responsive element is selected from the group consisting of:

(a) isolated nucleic acids consisting essentially of a sequence according to **SEQ ID NO: 1** or a fragment thereof, wherein said fragment is between about 20-455 consecutive nucleotides; and

(b) isolated nucleic acids that hybridize to the complement of **SEQ ID NO:1** and are responsive to a *Nic* gene product.

15. The method according to claim 11, wherein said *Nic* gene product responsive element consists of the sequence given herein as **SEQ ID NO:1**.

16. The method according to claim 11, wherein said nucleic acid is contained within a recombinant nucleic acid construct, wherein said isolated nucleic acid is joined to said recombinant nucleic acid construct, said recombinant nucleic acid construct does not contain *NtQPT1* coding sequence, and said recombinant construct is linear.

17. The method according to claim 16, wherein said recombinant nucleic acid construct is circular.

18. The method according to claim 11, wherein said nucleic acid is a DNA.

19. The method according to claim 11, wherein said introducing step comprises ballistic transformation.

20. The method according to claim 11, wherein said introducing step comprises *Agrobacterium* transformation.

21. A tobacco plant produced by the method of claim 11.

22. A tobacco leaf collected from a tobacco plant of claim 21.

- 37 -

23. A tobacco seed collected from a tobacco plant of claim 21.

24. A tobacco plant having a reduced amount of nicotine therein, said plant comprising cells containing an exogenous nucleic acid, wherein said exogenous  
5 nucleic acid consists essentially of a *Nic* gene product responsive element; said exogenous nucleic acid contained in said cells in a copy number sufficient to reduce the amount of nicotine in said tobacco plant as compared to the amount of nicotine that would be present in said plant in the absence of said exogenous nucleic acid.

10 25. A tobacco plant according to claim 24, wherein said *Nic* gene product responsive element selected from the group consisting of:

(a) isolated nucleic acids consisting essentially of a sequence according to  
**SEQ ID NO: 1** or a fragment thereof, wherein said fragment is between about 20-455  
consecutive nucleotides; and

15 (b) isolated nucleic acids that hybridize to the complement of **SEQ ID NO:1**  
and are responsive to a *Nic* gene product.

20 26. A tobacco plant according to claim 24, wherein said *Nic* gene product responsive element consists essentially of the sequence given herein as **SEQ ID NO:1**.

27. A tobacco plant according to claim 24, wherein said exogenous nucleic acid is contained within a recombinant nucleic acid construct, wherein said isolated nucleic acid is joined to said recombinant nucleic acid construct, said recombinant  
25 nucleic acid construct does not contain *NtOPT1* coding sequence, and said recombinant construct is linear.

28. A tobacco plant according to claim 27, wherein said recombinant nucleic acid construct is circular.

30

29. A tobacco plant according to claim 24, wherein said exogenous nucleic acid is a DNA.

30. Tobacco leaf collected from a tobacco plant of claim 24.

31. Tobacco seed that germinate into a tobacco plant of claim 24.

32. Tobacco seed collected from a tobacco plant of claim 24.

33. A method of making a plant having an altered content of a protein of interest therein, wherein said protein of interest is regulated by a *cis*-acting element, said method comprising the steps of:

introducing an exogenous nucleic acid construct comprising said *cis*-acting element into at least one plant cell to produce at least one transformed plant cell,

said at least one transformed plant cell containing said exogenous nucleic acid in a copy number sufficient to increase or reduce the level of said protein of interest in a plant regenerated from said cells as compared to the amount of said protein of interest that would be present in the absence of said exogenous nucleic acid, subject to the proviso that said *cis*-acting element is not operably linked to a coding sequence or complement thereof for said protein of interest.

34. The method according to claim 33, wherein said *cis* acting element is a *cis*-acting activating element that binds an activator compound, which activator compound increases expression of said protein of interest in said plant, and with said at least one transformed plant cell containing said exogenous nucleic acid in a copy number sufficient to reduce the level of said protein of interest in a plant regenerated from said cells as compared to the amount of said protein of interest that would be present in the absence of said exogenous nucleic acid.

35. The method according to claim 33, wherein said *cis*-acting element is a *cis*-acting repressor element that binds a repressor compound, which repressor compound decreases expression of said protein of interest in said plant, and with said at least one transformed plant cell containing said exogenous nucleic acid in a copy number sufficient to increase the level of said protein of interest in a plant regenerated

- 39 -

from said cells as compared to the amount of said protein of interest that would be present in the absence of said exogenous nucleic acid.

5           36. The method according to claim 33, further comprising:  
generating a plant from said transformed plant cells

          37. The method according to claim 36, further comprising:  
collecting seed from said plant, said seed containing said exogenous nucleic  
acid in a copy number sufficient to reduce the level of said protein of interest in a  
10   plant regenerated from said seed as compared to the level of said protein of interest  
that would be present in the absence of said exogenous nucleic acid.

          38. The method according to claim 33, wherein said *cis*-acting element is  
selected from the group consisting of UAS-1, the vicilin box, site B, and the tobacco  
15   RB7 promoter root-specific *cis*-acting element.

          39. The method according to claim 33, wherein said exogenous nucleic acid is  
linear.

20           40. The method according to claim 33, wherein said exogenous nucleic acid is  
circular.

          41. The method according to claim 33, wherein said exogenous nucleic acid is  
a DNA.  
25

          42. The method according to claim 33, wherein said introducing step  
comprises ballistic transformation.

          43. The method according to claim 33, wherein said introducing step  
30   comprises *Agrobacterium* transformation.

          44. A plant produced by the method of claim 33.

45. Leaves, fruit, flowers, roots or tubers collected from a plant of claim 44.

46. Seed collected from a plant of claim 44.

5

47. A plant having altered levels of a protein of interest therein, said plant comprising cells containing an exogenous nucleic acid,

which exogenous nucleic acid comprises a *cis*-acting element that regulates the level of said protein of interest in said plant,

10

said cells containing said exogenous nucleic acid in a copy number sufficient to increase or reduce the level of said protein of interest in said plant as compared to the amount of said protein of interest that would be present in the absence of said exogenous nucleic acid, subject to the proviso that said *cis*-acting element is not operably linked to a coding sequence or complement thereof for said protein of interest.

15

48. The plant according to claim 47, wherein said *cis* acting element is a *cis*-acting activating element that binds an activator compound, which activator compound increases expression of said protein of interest in said plant, and with said at least one transformed plant cell containing said exogenous nucleic acid in a copy number sufficient to reduce the level of said protein of interest in said plant as compared to the amount of said protein of interest that would be present in the absence of said exogenous nucleic acid.

20

25

49. The plant according to claim 47, wherein said *cis*-acting element is a *cis*-acting repressor element that binds a repressor compound, which repressor compound decreases expression of said protein of interest in said plant, and with said at least one transformed plant cell containing said exogenous nucleic acid in a copy number sufficient to increase the level of said protein of interest in said plant as compared to the amount of said protein of interest that would be present in the absence of said exogenous nucleic acid.

30

- 41 -

50. The plant according to claim 47, wherein said exogenous nucleic acid is linear.

5 51. The plant according to claim 47, wherein said exogenous nucleic acid is circular.

52. The plant according to claim 47, wherein said exogenous nucleic acid is a DNA.

10 53. Leaf, fruit, flowers, roots or tubers collected from a plant of claim 47.

54. Seed that germinates into a plant of claim 47.

15 55. Seed collected from a plant of claim 47.

56. A method of decreasing expression of a protein of interest in a host cell, wherein transcription of said protein of interest is enhanced by a *cis*-acting activating element that binds an activator compound, which activator compound increases expression of said protein of interest in said host cell, said method comprising the steps of:

20 (a) providing a decoy recombinant nucleic acid construct comprising said *cis*-acting activating element; and

25 (b) introducing said decoy construct into said host cell in an amount sufficient to bind said activator compound and reduce expression of said protein of interest, subject to the proviso that said *cis*-acting element is not operably linked to a coding sequence or complement thereof for said protein of interest..

57. The method according to claim 56, wherein said host cell is a prokaryotic or eukaryotic cell.

30 58. The method according to claim 56, wherein said host cell is a bacterial cell.



59. The method according to claim 56, wherein said host cell is a fungi cell.

60. The method according to claim 56, wherein said host cell is an animal  
5 cell.

61. The method according to claim 56, wherein said host cell is a mammalian  
cell.

62. The method according to claim 56, wherein said host cell is a vascular  
10 plant cell.

63. The method according to claim 56, wherein said host cell is a monocot or  
dicot plant cell.

64. The method according to claim 56, wherein said decoy construct is a  
15 plasmid.

65. A method of increasing expression of a protein of interest in a host cell,  
wherein transcription of said protein of interest is reduced by a *cis*-acting repressor  
20 element that binds a repressor compound, which repressor compound reduces  
expression of said protein of interest in said host cell, said method comprising the  
steps of:

(a) providing a decoy recombinant nucleic acid construct comprising said *cis*-  
acting activating element; and  
25 (b) introducing said decoy construct into said host cell in an amount sufficient  
to bind said activator compound and increase expression of said protein of interest,  
subject to the proviso that said *cis*-acting element is not operably linked to a coding  
sequence or complement thereof for said protein of interest..

66. The method according to claim 65, wherein said host cell is a prokaryotic  
30 or eukaryotic cell.

- 43 -

67. The method according to claim 65, wherein said host cell is a bacterial cell.

68. The method according to claim 65, wherein said host cell is a fungi cell.

5

69. The method according to claim 65, wherein said host cell is an animal cell.

70. The method according to claim 65, wherein said host cell is a mammalian cell.

10

71. The method according to claim 65, wherein said host cell is a vascular plant cell.

72. The method according to claim 65, wherein said host cell is a monocot or dicot plant cell.

15

73. The method according to claim 65, wherein said decoy construct is a plasmid.

20